

Application No. 10/509,191
Attorney Docket No. 2002B039A

REMARKS

Claims 1-15, 19-31 are pending in the case.

Claims 16-18 have been canceled.

Claims 22-30 are withdrawn from consideration as being directed to non-elected subject matter.

Claims 1-15, 19-21, and 31 are under consideration by the Examiner.

Applicants would first like to express appreciation to Examiner Hailey for the courtesies extended to their representative during the discussion of January 10, 2006. During the discussion it was pointed out that the language "*consists essentially of*" in the claims, which are directed to a catalyst composition that *consists essentially of* rhodium and indium in specified amounts (emphasis added) excludes any possibility that Moser or Robinson can read or fairly suggest, each alone or taken together, the present invention. The following discussion is intended to summarize and elaborate upon the comments made during the aforementioned discussion of January 10, 2006.

Steam cracking of crude produces the desirable products ethylene, propylene and butene, which are some of the basic building blocks of the petrochemical industry. Alkynes and dienes are also produced, and these are typically undesired products. These undesired products can be hydrogenated, but a problem is over-hydrogenation to alkanes and "green oil", the former of which are thermodynamic "dead-end" with respect to building further chemicals, and the latter of which, in addition to being less valuable *per se*, decreases the life of the hydrogenation catalyst. Accordingly, finding a better way of getting rid of these undesired products is a continually sought after goal.

Accordingly, the present invention relates to an improved catalyst, a method of making the catalyst, and (currently withdrawn from consideration) a process for the

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selective hydrogenation of alkynes and diolefins to olefins. Specifically, the claims under consideration, Claims 1-15 and 19-21, are directed to (i) a catalyst composition *consisting essentially of* a rhodium component in the amount of less than 3.0 wt % and indium in the amount of 0.3 wt% to less than 5.0 wt %; and (ii) a method for making a catalyst composition comprising applying rhodium nitrate and indium formate or nitrate to a specified support to produce (essentially) the claimed catalyst.

Claims 1-5, 19-21 (and 31, discussed separately further below) are rejected over Robinson et al. (U.S. 4,522,935) and Claims 1-10 are rejected over Moser et al. (U.S. 6,514,904), both applied under 35 USC §103. Applicants urge that neither of these references can possibly suggest the present invention, that the present claim language excludes compositions according to either Robinson et al. or Moser et al., and furthermore that the present specification has presented a comparison and evidenced superior results over the closest prior art, which Applicants believe to be a currently available commercial catalyst.

The phrase "consisting essentially of" has long been accepted to limit the scope of a claim to the specified ingredients and those that do not materially affect *the basic and novel characteristics* of a composition (*c.f.*: In re Janakirama-Rao, 137 U.S.P.Q. 893). However, the burden is on Applicant, when asserting that something effects the basic and novel characteristics of a composition, to prove that the additional elements in question affect the basic and novel characteristics of the invention. In re De Lajarte, 143 U.S.P.Q. 256. We believe that such evidence is clear from the references themselves.

Robinson et al. and Moser et al. are both directed to a catalyst for reforming hydrocarbons.

Catalytic reforming is a process used to convert low-octane naphthas into high-octane gasoline blending components called reformates. Reforming represents the total effect of numerous reactions such as cracking, polymerization, *dehydrogenation*, and isomerization taking place simultaneously. Depending on the properties of the naphtha feedstock (as measured by the paraffin, olefin, naphthene, and aromatic content) and catalysts used, reformates can be produced with very high concentrations of toluene,

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benzene, xylene, and other aromatics useful in gasoline blending and petrochemical processing. Hydrogen, a significant by-product, is separated from the reformat for recycling and use in other processes. This is all well-known and available from textbooks and encyclopedias.

Clearly, the composition of the present invention is used for a completely different purpose than the composition set forth by Robinson et al. or Moser et al. The present catalyst consumes hydrogen, the catalyst of the references produces hydrogen. One of ordinary skill in the art, assuming *arguendo* that they even looked at these references, would never arrive at the present composition from Robinson et al. or Moser et al. How would one know what metal to exclude from a reforming catalyst to make it a selective hydrogenation catalyst, selectively hydrogenating triple bonds and diolefins to make simple monoolefins? Should one take out the halogen? Or should one take out tin? Or perhaps one should take out the platinum group metal or one of the plethora of metals recited along with indium as "optional" or as a "promoter" metal in the references.

Robinson et al. requires the use of tin and a halogen, in addition to indium (among other numerous possibilities) and a "platinum group metal", and Moser et al. requires the use of halogen plus a "promoter" which may be indium or it may be something else. Apparently, then, if tin (according to Robinson et al.) and a halogen (according to both references) were added to the present composition, it would (evidently) transform the hydrogenation catalyst of the present invention into a reforming catalyst! Following the teachings of the references and adding such elements would clearly affect the *basic and novel characteristics* of the present invention.

Claim 31 is now directed to a supported catalyst composition effective for the selective hydrogenation of alkynes and diolefins to olefins, the support comprising alumina, zirconia, or ceria-alumina, and having less than 3.0 % rhodium by weight of the total supported catalyst composition, deposited from rhodium nitrate; and having 0.3-5.0% indium by weight of the total supported catalyst composition, deposited from indium nitrate or indium formate.

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Thus, by the way of the amended claim language, *whatever* other elements are present (as allowed by the language "comprising"), if any, the catalyst *must* be effective for the selective hydrogenation of alkynes and diolefins to olefins. *If* the elements added where those suggested by Robinson et al. or Moser et al., the catalyst would then become a reforming catalyst, which cracks, polymerizes, dehydrogenates, and isomerizes molecules, as discussed above. None of these reactions are desired in the present invention. The preferred commercial catalysts for selective dehydrogenation (over which unexpectedly superior results are shown in the present specification) comprise Pd/Ag. It would be pure speculation to suggest that the catalysts taught in Robinson et al. or Moser et al. would be effective for the purposes of the present invention.

Accordingly, Applicants submit that the reference of record cannot fairly suggest the present claims and respectfully request that the rejections under §103 be withdrawn.

Claims 16-18 were rejected under 35 USC §112, second paragraph, because the claims no longer appear to limit the claim(s) from which they depend. Accordingly, these claims are cancelled.


Finally, Applicant's respectfully ask for reconsideration of the restriction requirement which removed Claims 22-30 from consideration. At a minimum, since the present Claim 11 is believed to be a linking claim (Claim 22 depends from Claim 11), we believe it should be examined and allowed, on the basis of the above-recited arguments over the references of record, and also further in view of the showing of unexpected results in the specification as originally filed. More specifically, in a process for selectively removing alkynes or diolefins from a feedstock using the catalyst of Claim 11, superior results are shown (in Example 2) for a catalyst according to the present invention when compared with the closest prior art, which is believed to be the commercial Pd/Ag catalyst shown in Comparative Example 1.

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There being no further issues, Applicants respectfully urge that the present application is in condition for allowance and early indication of such is earnestly solicited.

Respectfully submitted,

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Date



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